

Transmittal Letter to the United States Designated/Elected Office (DO/EO/US) Page 1  
FORM PTO-1390  
JC02 Rec'd PCT/PTO 28 DEC 2000

Pocket No. : 918-002  
 B.S. Application No. : TBA  
 International Application No. : PCT/IB99/01214  
 International Filing Date. : June 28, 1999 (28 June 99)  
 Title of Invention : FUEL-AIR MIXTURE APPARATUS  
 Applicant(s) for (DO/EO/US) : OMARSSON, Kristian Bjorn

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. X This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2.     This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. X This express request to begin national examination procedures 35 U.S.C. 371 (f) at any time rather than delay examination until the expiration of the applicable time limit set forth in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. X A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. X A copy of the International Application as filed [35 U.S.C. 371(c)(2)].
  - a) X is transmitted herewith (required only if not transmitted by the International Bureau).
  - b)     has been transmitted by the international Bureau.
  - c)     is not required, as the application was filed in the United States Receiving Office (RO/US)
6.     A translation of the International Application into English [35 U.S.C. 371(c)(2)].
7. X Amendments to the claims of the International Application under PCT Article 19 [35 U.S.C. 371(c)(3)]
  - a) X are transmitted herewith (required only if not transmitted by the International Bureau).
  - b)     have been transmitted by the International Bureau
  - c)     have not been made; however, the time limit for making such amendments has NOT expired
  - d)     have not been made and will not be made.
8.     A translation of the amendments to the claims under PCT Article 19 [35 U.S.C. 371(c)(3)].
9. X An oath or declaration of the inventor(s) [35 U.S.C. 371(c)(4)]. **UNSIGNED**
10.     A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 [35 U.S.C. 371(c)(5)].

Items 11. to 16. below concern other document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 C.F.R. 1.97 and 198.
12. ☐ An Assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☐ A FIRST preliminary amendment.  
☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ (other items or information) **International Search Report**

EXPRESS MAIL No. EL676785821 US      Deposited, December 28, 2000

I hereby certify that this correspondence is being deposited with the United States Postal Service Express mail under 37 CFR 1.10 on the date indicated above and is addressed to the Commissioner of Patents and Trademarks, Washington, DC 20231

December 28, 2000

Ester Aronova

Date \_\_\_\_\_

09/720833

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a) ☐ A check in the amount of \$ 465.00 to cover the above fees is enclosed.

b) ☒ Please charge my Deposit Account No. 19-2825 in the amount of \$ 930.00 to cover the above fees.  
A duplicate copy of this sheet is enclosed.

c) ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 19-2825. A duplicate copy of this sheet is enclosed

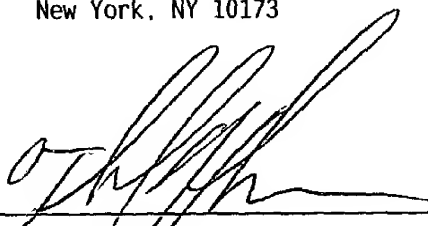
NOTE: Where an appropriate time limit under 36 CFR 1.494 or 1.495 has not been met, a petition to revive [37 CFR 1.137(a) or (b)] must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Joseph Sofer  
342 Madison Avenue  
Suite 1921  
New York, NY 10173

Thomas C. Hughes

Name

  
signature

42,674

Reg. No.

December 28, 2000

Date

17. X The following fees are submitted.

BASIC NATIONAL FEE [37 CFR 1.492(a)(1)-(5)]:

X Search Report has been prepared by the EPO or JPO..... \$ 930.00  
  
\_\_\_ International preliminary examination fee paid to USPTO [37 CFR 1.482]... \$ 680.00  
\_\_\_ No International preliminary examination fee paid to USPTO [37 CFR 1.482]  
but International search fee paid to USPTO [37CFR 1.445(a)(2):. . . . . \$ 750.00  
\_\_\_ Neither International preliminary examination fee [37 CFR 1.482] nor  
International search fee [37 CFR 1.445(a)(2)] paid to USPTO..... \$ 1010.00  
\_\_\_ International preliminary examination fee paid to USPTO [37 CFR 1.482]  
and all claims satisfied provisions of PCT Article 33 (2) to (4): .. . \$ 94.00

ENTER APPROPRIATE BASIC FEE AMOUNT: \$ 930.00

Surcharge of \$ 130.00 for furnishing the oath or declaration later than 20 X 30 months  
from the earliest claimed priority date [37 CFR 1.492(e)]

Claims	filed	Extra	Rate
Total Claims	-20=	0 x	\$ 18.=
Indep. Claims	- 3=	0 x	\$ 74.=
Multiple Dependent Claims (if applicable) + \$ 230 =			

TOTAL OF ABOVE CALCULATIONS: \$ 930

Reduction by ½ for filing by small entity, if applicable. Verified Small Entity  
Statement must be filed also. [Note 37 CFR 1.9, 1.27, 1.28]

(divided by 2)

SUBTOTAL: \$

Processing fee of \$ 130.00 for furnishing the English Translation later than 20    30 months  
from the earliest claimed priority date [37 CFR 1.492(f)]

TOTAL NATIONAL FEE: \$ 930.00

Fee for recording the enclosed assignment [37 CFR 1.21(h)] The assignment must be  
accompanied by an appropriate cover sheet [37 CFR 3.28, 3.31]. \$ 40.00 per property

TOTAL FEES ENCLOSED: \$ 930.00

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FUEL-AIR MIXTURE APPARATUS

09/720833

Background of the Invention

The present invention relates to a fuel-air mixture apparatus, particularly for  
5 an internal combustion engine.

Fuel-air mixture apparatuses of the type where fuel is mixed with air prior to  
induction into the cylinder(s) of an engine generally rely on a pressure reduction at a  
throttle in the device to draw fuel into the device, in which case the device is known  
10 as a carburettor, or rely on fuel injection into the air as it passes through the device.

Generally, the prior devices rely on a single stage of mixture of fuel and air  
and are limited as regards the droplet size and total vaporisation of the fuel in the air  
which they induce. Inadequate vaporisation and too large a droplet size result in  
15 unburned and/or incompletely burnt fuel being present in the exhaust from the engine.

In my International Application No WO 97/48897, I have described and  
claimed an invention which I refer to below as "My Earlier Invention" and which  
comprises a fuel-air mixture apparatus having.

- 20 • a primary air passage having an inlet, an adjustable throttle and an outlet,
- a secondary air passage having an inlet and an outlet to the primary air passage  
between its adjustable throttle and its outlet,
- a variable orifice nozzle for introducing fuel into the secondary air passage,  
the nozzle having a mouth and a down-stream pointing tapered needle in the  
25 mouth to provide variability of the orifice by axial movement of the needle  
and
- a linkage or control device for linking or controlling the position of the needle  
to the position of the adjustable throttle in the primary air passage for  
adjustment of the orifice of the nozzle,
- 30 the arrangement being such that in use the fuel mixes with the air flowing through the  
secondary air passage prior to mixing with the air flowing in the primary air passage.  
and the fuel flow from the nozzle is matched to the position of the adjustable throttle

CONFIRMATION COPY

### The Invention

The object of the present invention is to a further improved fuel air mixture apparatus.

5           The invention is based on passing a fuel-air mixture through an apertured vaporisation block in the apparatus to enhance the degree of mixing of the fuel with the air.

10           According to my present invention, there is provided a fuel-air mixture device comprising

- a primary air passage having an inlet, an adjustable throttle and an outlet,
- a variable orifice nozzle for introducing fuel to the primary air passage, the nozzle having a mouth and a tapered needle in the mouth to provide variability of the orifice by axial movement of the needle, the needle being arranged  
15           transversely of the primary air passage and
- a linkage or control device for linking or controlling the position of the needle to the position of the adjustable throttle in the primary air passage for adjustment of the orifice of the nozzle and
- an apertured vaporisation block having a plurality of air passageways through  
20           the block, which subdivide a portion of the primary air passage between the fuel introduction position and the outlet

25           The apertured vaporisation block may be integral with a member defining the primary air passage. Alternatively it may be fitted to the latter. In this case, the apertured vaporisation block may be mounted in such manner as to be ultrasonically excitable. Typically this can be by mounting the block in an ultrasonically excitable ring. Alternatively, the passageways in the block can be lined by ultrasonically excitable tubes

30           The apertured vaporisation block can be a solid block in which the air passageways are formed by machining or casting. Alternatively, the apertured vaporisation block can be laid up from a plurality of layers, preferably by winding, the layers having regular formations extending out from each layer to space it from the

next layer. The formations at each layer can be continuous with the formations at the next or inter-spaced with the formations at the next.

5 In one preferred embodiment, the apertured vaporisation block is provided wholly downstream of the position of the fuel introduction means, preferably with an upstream face of the apertured vaporisation block being formed concavely, preferably conically.

10 In another preferred embodiment, the apertured vaporisation block is provided at and extending downstream of the position of the fuel introduction means

Whilst I envisage the contrary, I prefer that the present fuel-air mixture apparatus should be fully in accordance with My Earlier Invention, that is to say incorporating.

- 15
- a secondary air passage having an inlet and an outlet to the primary air passage between its adjustable throttle and its outlet,
- the arrangement being such that in use the fuel mixes with the air flowing through the secondary air passage prior to mixing with the air flowing in the primary air passage and the fuel flow from the nozzle is matched to the position of the adjustable throttle.

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In the embodiment wherein the apertured vaporisation block is provided at and extending downstream of the position of the fuel introduction means, the apertured vaporisation block has at least one transverse bore leading from the secondary air passage to a respective one of the air passageways through the block. Each of the

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passageways can have a transverse bore leading from the secondary air passage. Alternatively, some of the air passageways may not be in communication with the secondary air passage and not receiving fuel-air mixture in use. Some of the air passageways may be in communication with the secondary air passage only via others of them

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The fuel introduction needle may extend into one or more of the air passageways in the apertured vaporisation block.

It is envisaged that the passageway(s) having the transverse bore(s) can be configured as venturi(s) with the narrowest throat(s) being at the orifice(s) of the transverse bore.

5 To aid mixture of the fuel with the air in the passageways, the latter can have turbulence inducing formations downstream of the transverse bore.

To help understanding of the invention, a specific embodiment thereof will now be described by way of example and with reference to the accompanying  
10 drawing, in which

Figure 1 is a cross-sectional side view of a fuel-air mixture apparatus of the invention,

Figure 2 is a scrap cross-sectional view on a larger scale of the needle actuator in the apparatus of Figure 1 with the needle in its closed position;

15 Figure 3 is a similar view of the actuator with the needle in its open position;

Figure 4 is a similar view of an alternative air passageway block,

Figure 5 is a view similar to Figure 1 of an alternative apparatus of the invention,

Figure 6 is a cross-sectional end view of the air passageway block in the  
20 apparatus of Figure 5,

Figure 7 is an end and perspective view of another alternative air passageway block; and

Figure 8 is a similar pairs of views of yet another air passageway block.

25 The fuel-air mixture device shown in Figure 1 is a carburettor. It has an air passage member 1 defining a primary air passage 2 with an inlet 3, an adjustable throttle 4 and an outlet 5. The inlet will be connected in use to an air cleaner (not shown), the outlet will be connected to an engine manifold (not shown) and the throttle will be connected to a throttle control (also not shown). The throttle has a  
30 vane 6 carried on a shaft 7 journaled in a body 8 - into which the air passage member 1 is fitted - and having at one end a cam plate 9 against which a needle actuator 10 bears

Referring additionally to Figures 2 & 3, the needle actuator is slidingly accommodated in a needle carrier 11 fitted into a bore 12 in the body 8 and sealed there by a pair of O-rings 13. The needle carrier is retained by a flange 14 against which a block 15 acts, the block being held in place by the throttle shaft 7. Between the O-rings 13, the needle carrier has a circumferential groove 16, which opens to the interior 17 of the needle carrier 11. A fuel supply duct 18 in the body communicates with a fuel supply line 19 and the groove 16. The interior of the needle carrier is defined by a bore 20 in which the needle actuator 10 is accommodated in a fuel tight manner, with a seal 21 in a groove at the bottom end of the actuator. A spring 22 in a lubricant chamber 23 acts beneath a flange 24 on the needle actuator and urges the latter via an end dome 25 against a rotary cam surface 26 of the cam plate 9. A needle 27 is carried axially of the needle carrier in a bore 28 in the needle actuator 10. The needle has a head 29 accommodated in the actuator. A spring 30 captivated by the dome 25 urges the needle 27 towards the primary air passage 2. A seal 31 on the needle seals it to its actuator 10. A shank 32 of the needle extends from the actuator and has at its opposite end a groove carrying an O-ring 33 and a steep taper 34, which can seat in an internal orifice 35 in the needle carrier 11, with the O-ring 33 seating just outside the orifice (see Figure 2), when the needle actuator is displaced so far by the cam as to cause the head 29 and/or the seal 31 to lift from an abutment 36 in the carrier on which it normally engages, as shown in Figure 2.

In the normal operating position of the cam plate 9, as shown in Figure 3, with the needle actuator lifted by the spring 22, the needle head 29, seal 31 and abutment 36 are held together and the taper 34 is drawn clear of the orifice 35. The needle has a finely tapered needle proper 37 extending on through the orifice from the thin end of the steep taper, for varying the extent to which the orifice is open to the passage of fuel in accordance with the longitudinal position of the needle. This position is directly linked to the position of the throttle by the cam.

The needle terminates in a "pip" 38, which encourages any fuel running along its fine taper to shed as a fine droplets.

Beyond the orifice 35 of the needle carrier 11, it has an extension 39 having two external grooves 40,41, from which lead bores 42,43 to an outwardly tapering



mouth 44 of the carrier. This is in register with a similarly tapering opening 45 in the air passage member 1, opening into the primary air passage 2.

A secondary air passage 46 leads from the primary air passage 2 upstream of the throttle 4. The passage 46 branches into two 47,48. The smaller 47 of these leads via a slow running, secondary air flow adjustment 49 to the upper groove 40, whose bores 42 open to the narrow end of the tapered mouth 44. The larger secondary air branch 48 intercepts the bore 49 in which the throttle shaft 7 is journalled. At the interception, the shaft has a flat 50, which aligns with the branch when the throttle is open, but closes the branch when the throttle is closed for slow running, whereby the secondary air all passes via the other branch. The larger branches opens into the groove 41, via which its air passes on to the bores 43 and into the mouth 44 for mixing with the fuel metered by the needle

Down-stream of the mouth 44, a block 51 is provided across the primary air passage 2. It is mounted in a ring 52 of piezoelectric material provided with an excitation circuit 53. The block has a plurality of passageways 54 through it for air flow towards the inlet manifold. These increase the turbulence in the air flow and increase the surface area on which fuel can deposit as fine droplets during the periods of stagnation corresponding to compression, ignition and exhaust for a single cylinder engine

In operation of the carburettor, the throttle is opened. This allows the needle to move back from its position closing the orifice 34. Fuel, generally petrol, is allowed to flow at a rate appropriate to the throttle opening. It enters the mouth 44 and mixes with the secondary air flow. This air and the fuel, which represent a rich and non-homogeneous mixture, flows on to the primary air passage. Here mixture of the fuel and air reaches the desired composition. On entering the passageways 54, the homogeneity is improved by turbulence in the passageways and by the provision of a large surface area on which fuel can deposit during stagnation and be (re-)evaporated during air flow. Further turbulence occurs on exit from the passageways

Figure 4 shows an alternative construction of the block 51', in which the ring 52 is dispensed with and replaced by a series of piezoelectric tubes 55, which are all excitable. This block also has a conically, concave upstream face 56, which encourages laminar flow in the tubes 55. In a further, simpler alternative, the piezoelectric elements can be dispensed with as in the following embodiment.

Turning now to Figures 5 & 6, the carburettor there shown is essentially similar to that of Figures 1, 2 & 3, except that the block 151 is positioned to receive the secondary air flow directly into its passageways 154. In place of the mouth 44, the air passage member 101 has a V-slot 144 cut in it, to spread partially around the block. The block has a number of bores 160 opening from the slot 144 to convey the flow of secondary air and fuel to some of the passageways 1541. Others 1542 do not receive secondary airflow. The fuel is mixed with air flowing in these downstream of the block 151 due to turbulence in the air streams leaving the passageways.

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A number of variants can be envisaged. The needle may extend into one of the radial bores aligned with the needle. As shown the passageways 154 are parallel bores. At least those 1541 into which the radial bores lead may be formed with venturis at the junction with these bores to encourage the secondary air flow into them. Further downstream of the bores, the passageways may be provided with surface roughness to promote turbulent air flow and mixture of the fuel and air flowing in them.

Whilst the apertured vaporisation blocks 51, 51', 151 are solid blocks in which the passageways are formed by machining or casting, the alternatives 251, 351 shown in Figures 6 & 7 formed of a plurality of layers 2511, 3511. These are of sheet metal and spirally wound. The layers 2511 have a series of spacers 2512, which are two thicknesses of the sheet metal abutted and adhered together to form the spacers with a height equal to the spacing of the layers. The spacers are aligned to give structure rigidity. The layers 3511 have similar spacers 3512, but which are not abutted, and meet the next layer at peaks 3513, which are adhered to the next layer. The spacers can be angled with respect to the direction of their spiral winding, to give airflow

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through the block a vortex flow. As an alternative to the spacers being wound, they could be cast or moulded.

The invention is not intended to be restricted to the details of the above described embodiment. Various alternatives have been identified in the description above just before the description of the drawing. In addition, the passageways may be provided in a variety of sizes. As in my earlier invention, the direct mechanical linkage between the position of the needle and the position of the throttle can be replaced by electronic control.

Claims

- 1 A fuel-air mixture device comprising.
- a primary air passage having an inlet, an adjustable throttle and an outlet,
  - a variable orifice nozzle for introducing fuel to the primary air passage, the  
5 nozzle having a mouth and a tapered needle in the mouth to provide variability of the orifice by axial movement of the needle, the needle being arranged transversely of the primary air passage and
  - a linkage or control device for linking or controlling the position of the needle to the position of the adjustable throttle in the primary air passage for  
10 adjustment of the orifice of the nozzle and
  - an apertured vaporisation block having a plurality of air passageways through the block, which subdivide a portion of the primary air passage between the fuel introduction position and the outlet
- 2 A fuel-air mixture device as claimed in claim 1, wherein the apertured  
15 vaporisation block is integral with a member defining the primary air passage
3. A fuel-air mixture device as claimed in claim 1, wherein the apertured vaporisation block is a member fitted to the primary air passage.
- 4 A fuel-air mixture device as claimed in claim 3, wherein the apertured vaporisation block is mounted in such manner as to be ultrasonically excitable.
- 20 5 A fuel-air mixture device as claimed in claim 4, wherein the apertured vaporisation block is mounted in an ultrasonically excitable ring
- 6 A fuel-air mixture device as claimed in claim 4, wherein the passageways in the block are lined by ultrasonically excitable tubes
7. A fuel-air mixture device as claimed in any preceding claim, wherein the  
25 apertured vaporisation block is a solid block in which the air passageways are formed by machining or casting.
8. A fuel-air mixture device as claimed in any one of claims 1 to 6, wherein the apertured vaporisation block is laid up from a plurality of layers, preferably by winding, the layers having regular formations extending out from each layer to space  
30 it from the next layer.
9. A fuel-air mixture device as claimed in claim 8, wherein the formations at each layer are continuous with the formations at the next

10 A fuel-air mixture device as claimed in claim 8, wherein the formations at each layer are inter-spaced with the formations at the next

11. A fuel-air mixture device as claimed in any preceding claim, wherein the  
5 apertured vaporisation block is provided wholly downstream of the position of the fuel introduction means

12. A fuel-air mixture device as claimed in claim 11, wherein an upstream face of the apertured vaporisation block is concavely formed, preferably conically.

13. A fuel-air mixture device as claimed in any one claims 1 to 10, wherein the  
10 apertured vaporisation block is provided at and extending downstream of the position of the variable orifice nozzle

14. A fuel-air mixture device as claimed in any preceding claim, including:  
• a secondary air passage having an inlet and an outlet to the primary air passage between its adjustable throttle and its outlet,

the arrangement being such that in use the fuel mixes with the air flowing through the  
15 secondary air passage prior to mixing with the air flowing in the primary air passage and the fuel flow from the nozzle is matched to the position of the adjustable throttle

15. A fuel-air mixture device as claimed in claim 14, wherein the apertured vaporisation block has at least one transverse bore leading from the secondary air passage to a respective one of the air passageways through the block

20 16. A fuel-air mixture device as claimed in claim 15, wherein each of the passageways has a transverse bore leading from the secondary air passage.

17 A fuel-air mixture device as claimed in claim 15, wherein some of the air passageways are not in communication with the secondary air passage, whereby they do not receive fuel-air mixture in use

25 18. A fuel-air mixture device as claimed in claim 15, claim 16 or claim 17, wherein some of the air passageways are in communication with the secondary air passage only via others of them

19. A fuel-air mixture device as claimed in any one of claims 14 to 18, wherein the fuel introduction needle extends into one or more of the air passageways in the  
30 apertured vaporisation block

20. A fuel-air mixture device as claimed in any one of claims 15 to 19, wherein the passageway(s) having the transverse bore(s) are configured as venturi(s) with the narrowest throat(s) being at the orifice(s) of the transverse bore.

- 21 A fuel-air mixture device as claimed in any one of claims 15 to 20, wherein the passageway(s) have turbulence inducing formations downstream of the transverse bore(s), to aid mixture of the fuel with the air in the passageways
22. A fuel-air mixture device as claimed in any preceding claim, including.
- 5     • a shaft on which the throttle is carried,  
     • a cam plate carried on a shaft and  
     • an actuator for the tapered needle bearing against the cam plate.
23. A fuel-air mixture device as claimed in claim 22, wherein the needle actuator is accommodated in a fuel tight manner in a needle carrier and extends into a lubricant  
10 chamber where the cam plate acts on it
- 24 A fuel-air mixture device as claimed in claim 23, wherein the needle is carried axially of the needle actuator and spring biased towards the primary air passage for closure of a fuel outlet orifice from the needle carrier to the primary air passage by engagement of a taper of the needle in the orifice.
- 15 25 A fuel-air mixture device as claimed in claim 24, wherein the needle carries an O-ring arranged to seal additionally the orifice with the needle
26. A fuel-air mixture device as claimed in claim 23, claim 24 or claim 25, wherein the needle carrier has an extension in communication with the primary air passage and the extension has two outlets from the secondary air passage into the  
20 extension
27. A fuel-air mixture device as claimed in claim 26, wherein one of the outlets is from a slow running branch of the secondary air passage, having a slow running air flow adjustment and a second branch which is normally open, except when closed by a closure valve on closure of the throttle.
- 25 28 A fuel-air mixture device as claimed in claim 27, wherein the closure valve comprises a flat on a shaft of the throttle, which is arranged to open the branch when the throttle is open

PCT

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International Bureau



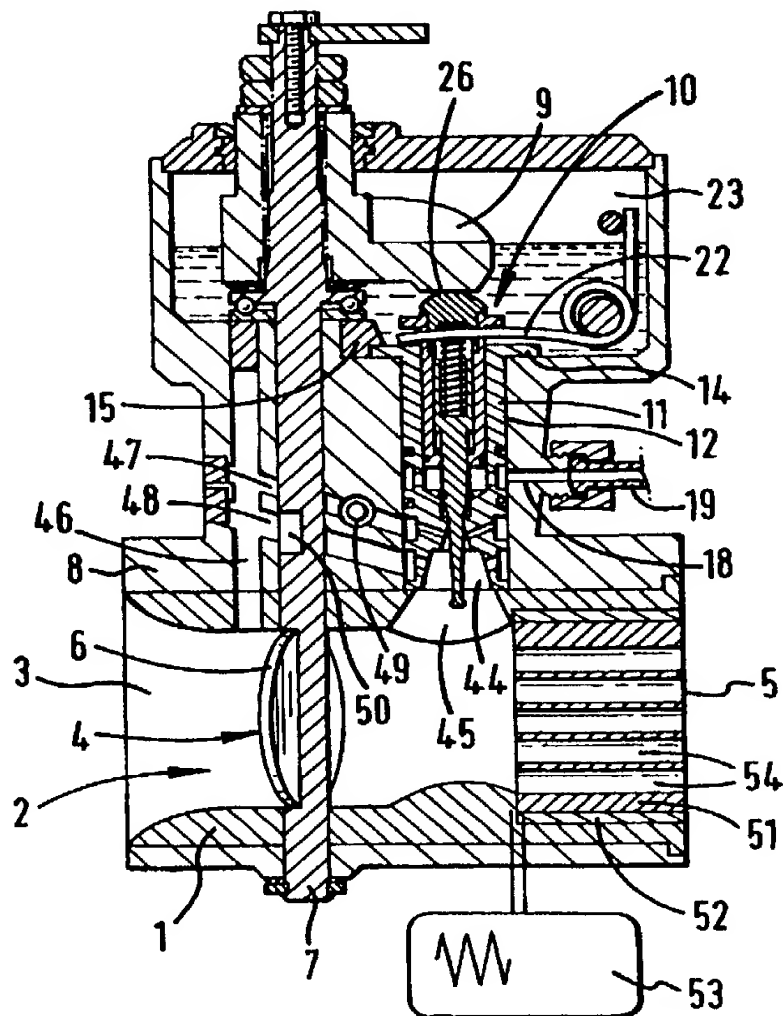
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification <sup>7</sup> : F02M 29/04, 7/22</p>	<p>A1</p>	<p>(11) International Publication Number: <b>WO 00/01940</b> (43) International Publication Date: 13 January 2000 (13.01.00)</p>
<p>(21) International Application Number: PCT/IB99/01214 (22) International Filing Date: 28 June 1999 (28.06.99) (30) Priority Data: 9814100.5 1 July 1998 (01.07.98) GB (71)(72) Applicant and Inventor: ÓMARSSON, Kristján, Björn [IS/IS]; Grund, Villingsholtshreppi, IS-801 Selfoss (IS).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> <i>With international search report.</i></p>

(54) Title: FUEL-AIR MIXTURE APPARATUS

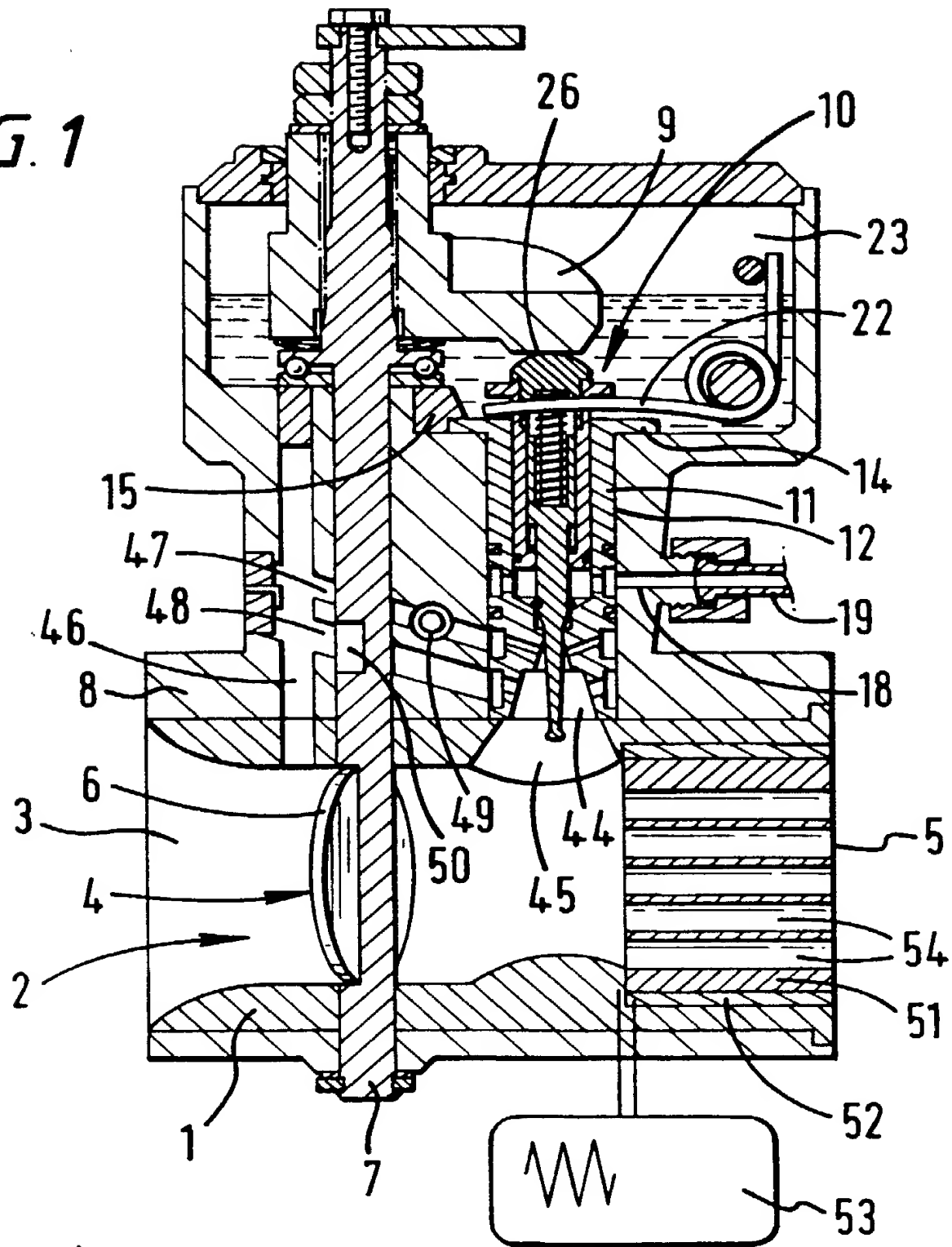
(57) Abstract

In a fuel-air mixture device, downstream of a throttle (10) and a fuel introduction device, a block (51) is provided across the primary air passage (2). The block has a plurality of passageways (54) through it for air flow towards an inlet manifold. These improve mixture of the fuel and air.



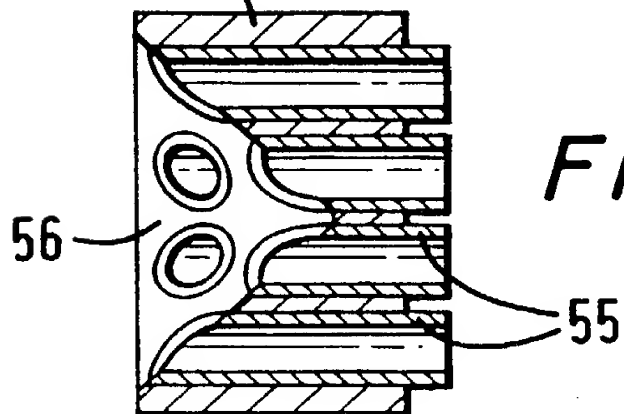
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FIG. 1



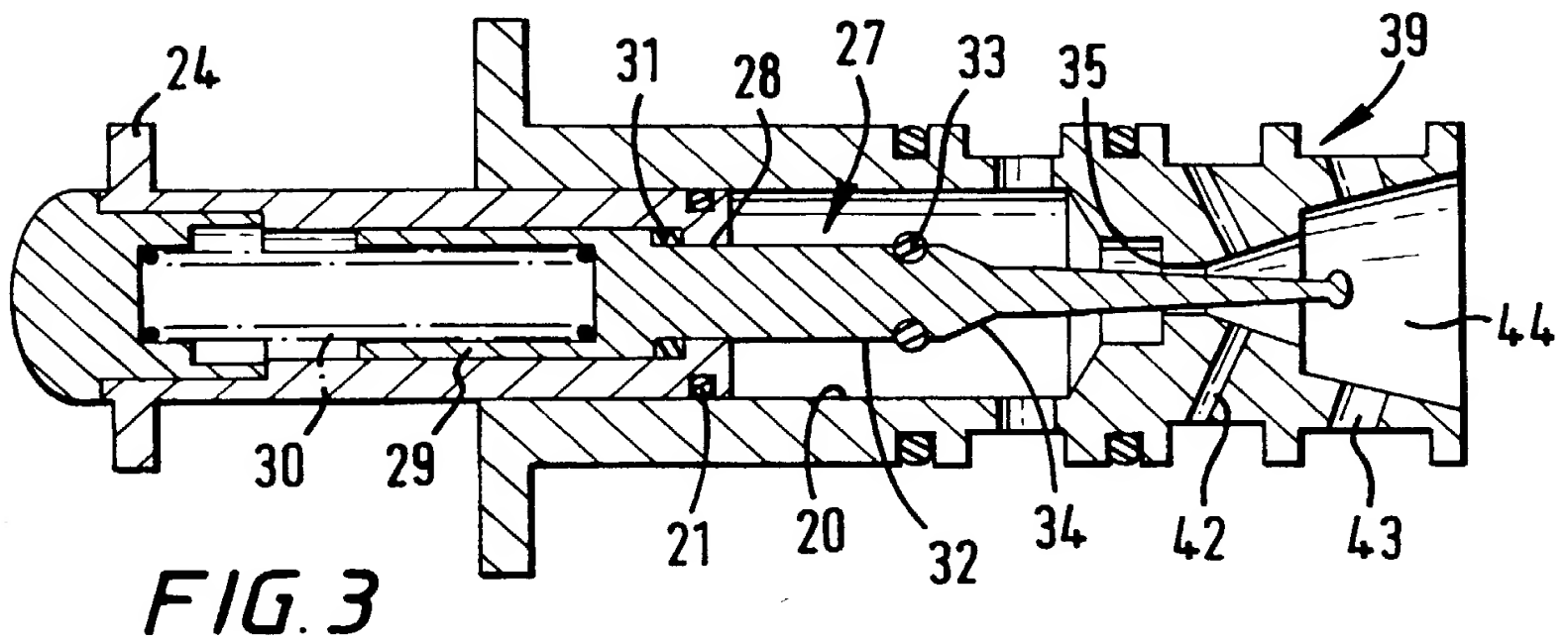
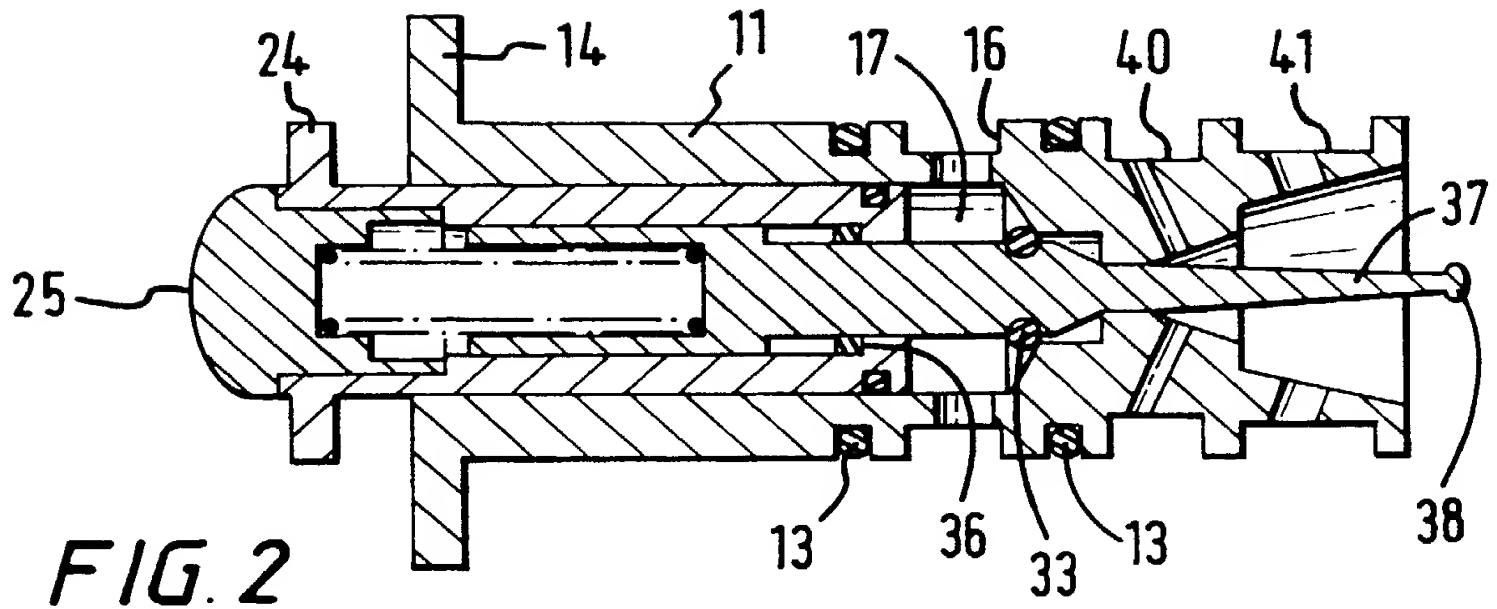
51'

FIG. 4





2/4



3/4

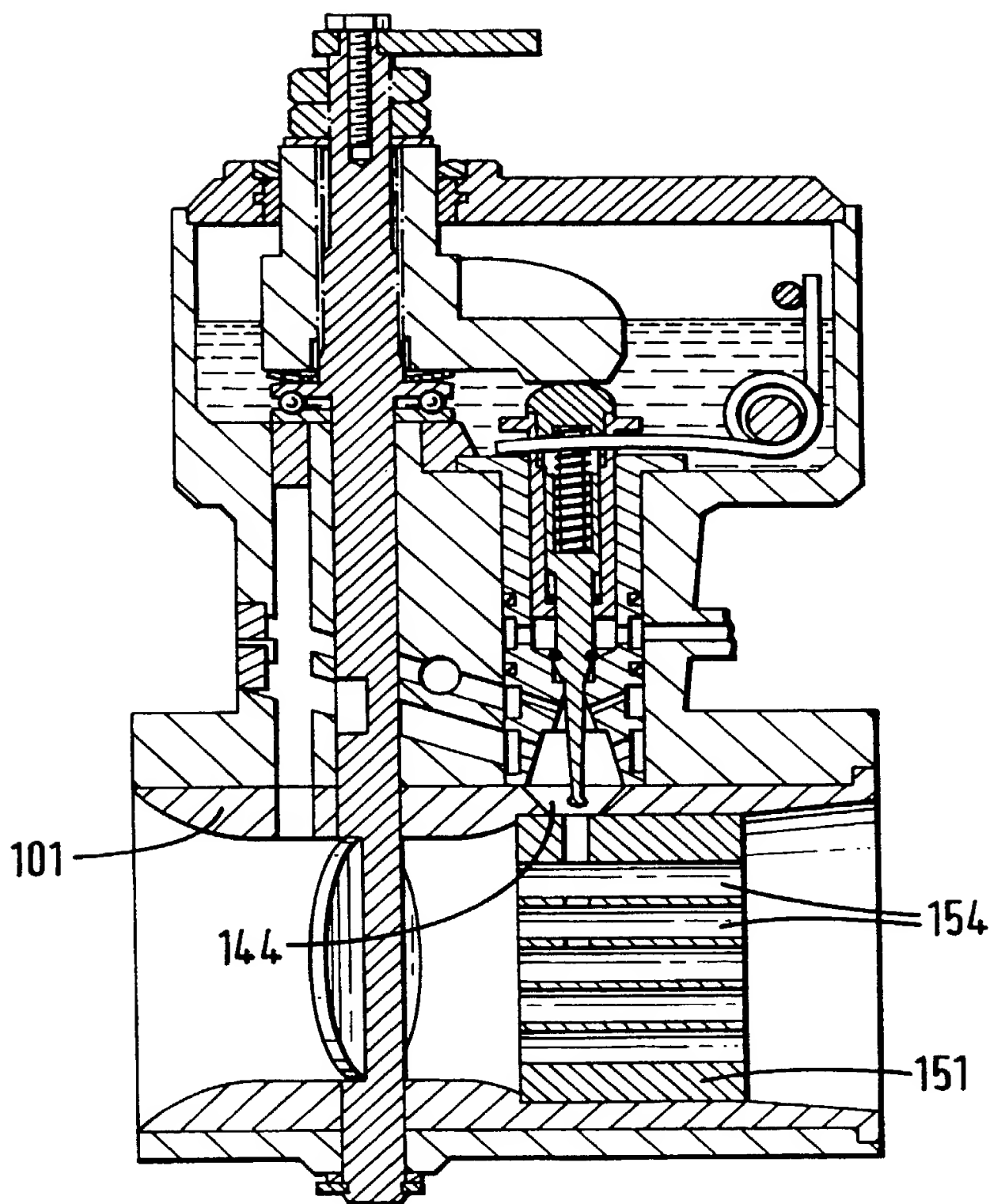
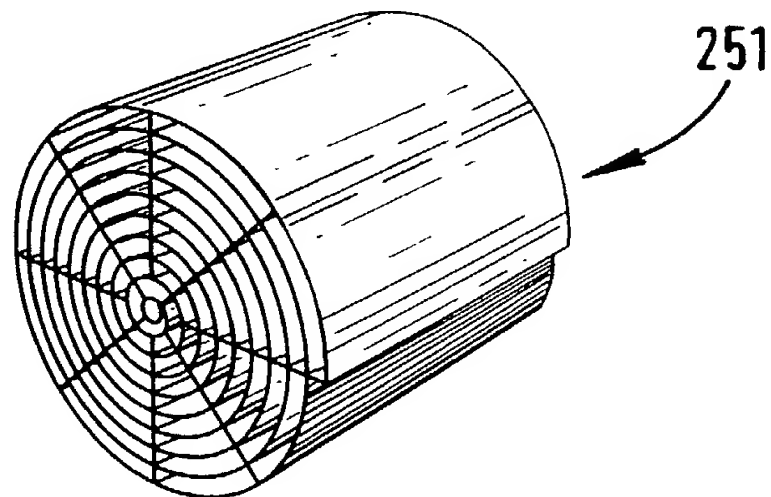
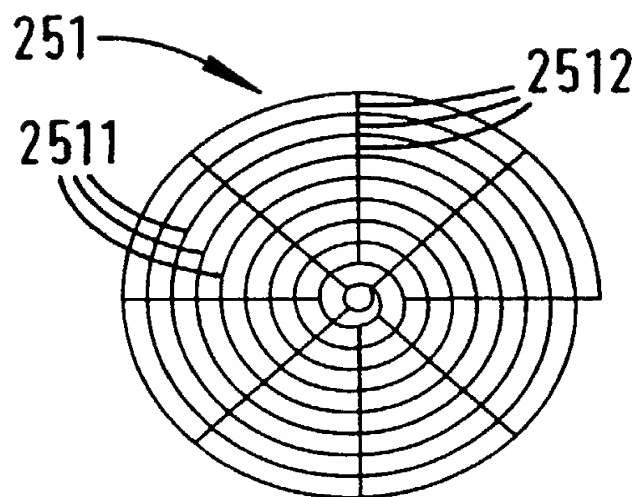
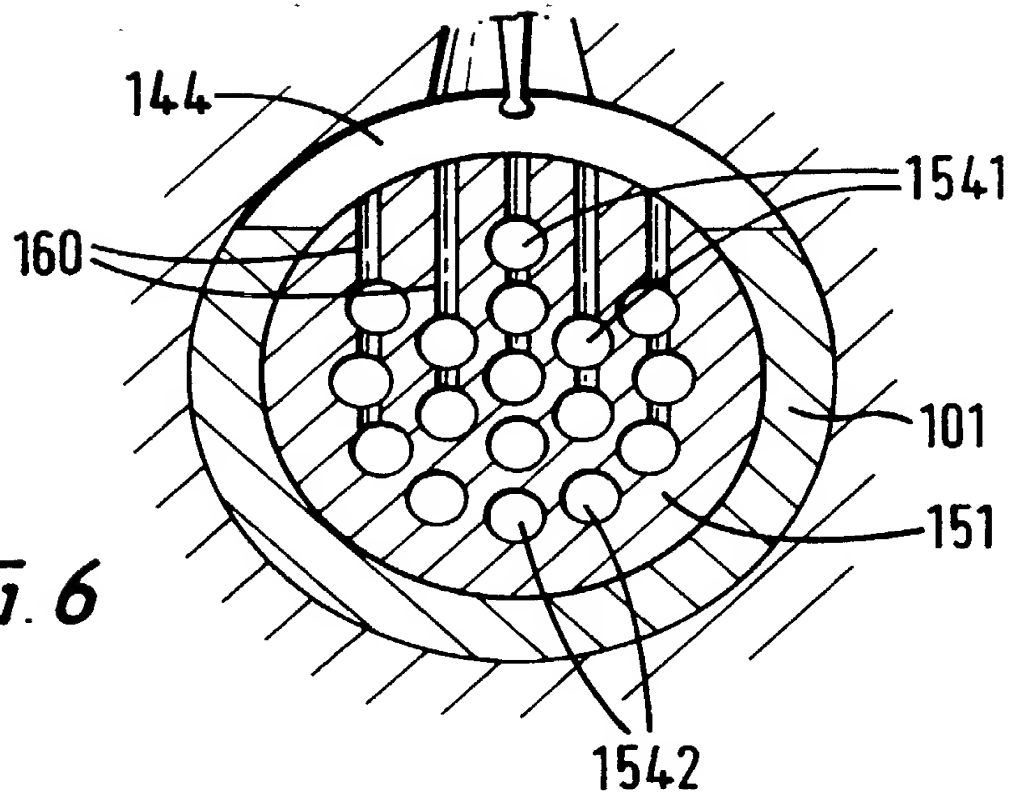


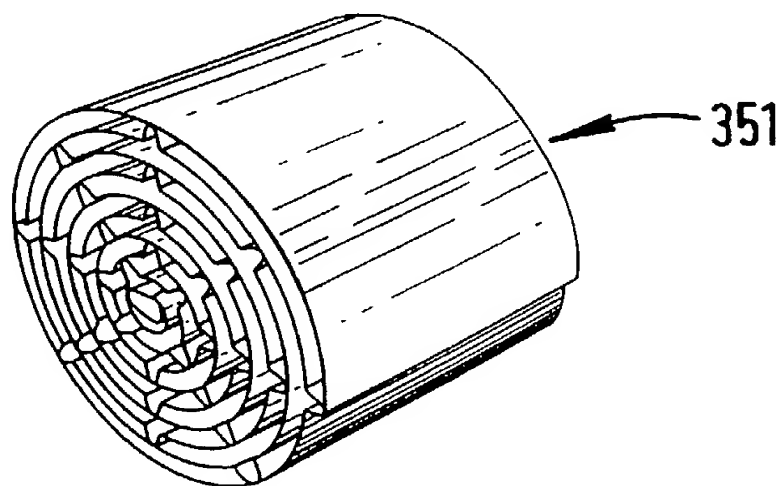
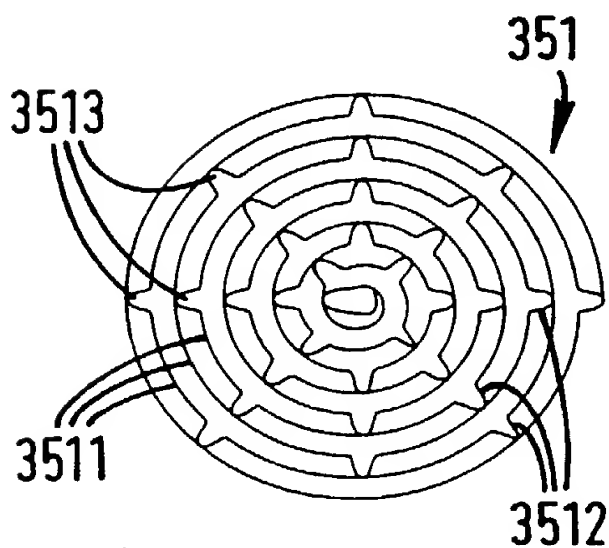
FIG. 5

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**FIG. 6**



**FIG. 7**



**FIG. 8**

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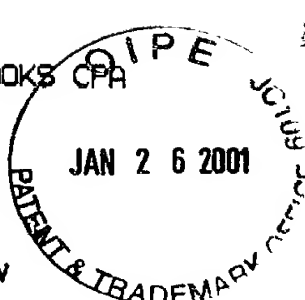
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TO 0035452032

P.02/04



SOPER & HAROUN, L.L.P.  
DECLARATION, POWER OF ATTORNEY & PETITION

ATTORNEY DOCKET NO: 918-002

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**  
**COMBINED DECLARATION, POWER OF ATTORNEY & PETITION**

**TYPE OF DECLARATION**

- ☐ Utility
- ☐ Design
- ☐ Supplemental
- ☐ Divisional
- ☐ Continuation
- ☐ Continuation-in-part
- ☒ National Stage of the PCT

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MAR 27 2001

OFFICE OF PETITIONS

**INVENTORSHIP AND SPECIFICATION IDENTIFICATION**

My residence, post office address and citizenship are as stated below next to my name; I believe I am the original, first and sole inventor (if only one is listed below) or a joint inventor (if plural inventors are named below) for which a patent is sought on the design entitled:

**FUEL-AIR MIXTURE APPARATUS**

as described and claimed in the specification which

- ☐ is attached hereto.
- ☐ was filed on \_\_\_\_\_
  - ☐ as U.S. Serial Number. \_\_\_\_\_; or
  - ☐ Express Mail No. \_\_\_\_\_ (as serial number not yet known); and
  - ☐ was amended on \_\_\_\_\_.
- ☒ was described and claimed in PCT International Application No. PCT/IB99/01214 filed on June 28, 1999; and
  - ☒ as amended under PCT Article 19 and/or 34 on July 5, 2000.

**REVIEW OF PAPERS AND DUTY OF CANDOR**

I have reviewed and understand the contents of the attached specification including the drawing and claims as amended by any amendment referred to below; and  
I acknowledge my duty to disclose information of which I am aware which is material to the examination of this application, in accordance with 37 CFR 1.56(a); and  
☐ in compliance with this duty there is attached an information disclosure statement.

*HTB*

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FROM NELL BROOKS CPA

TO 0035452002

P.03/04

SOFER & HAROUN, L.L.P.  
DECLARATION, POWER OF ATTORNEY & PETITION

ATTORNEY DOCKET NO: 918-002

### PRIORITY CLAIMS

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign applications for patent applications for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed	
<u>PCT/IB99/01214</u>	<u>PCT</u>	<u>June 28, 1999</u>	<input checked="" type="checkbox"/> [ X ]	<input type="checkbox"/> [ ]
(Number)	(Country)	(Day/Month/Year/Filed)	Yes	No
<u>9814100.5</u>	<u>United Kingdom</u>	<u>July 1, 1998</u>	<input checked="" type="checkbox"/> [ X ]	<input type="checkbox"/> [ ]
(Number)	(Country)	(Day/Month/Year/Filed)	Yes	No
<u>                    </u>	<u>                    </u>	<u>                    </u>	<input type="checkbox"/> [ ]	<input type="checkbox"/> [ ]
(Number)	(Country)	(Day/Month/Year/Filed)	Yes	No

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States Application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States Application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Serial No.)	(Filing Date)	(Status: Patented, Pending, Abandoned)
<u>                    </u>	<u>                    </u>	<u>                    </u>

(Application Serial No.)	(Filing Date)	(Status: Patented, Pending, Abandoned)
<u>                    </u>	<u>                    </u>	<u>                    </u>

### DECLARATION

I declare that all statements made above of my own knowledge are true and all statements made on information and belief are believed to be true; and these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

KBO

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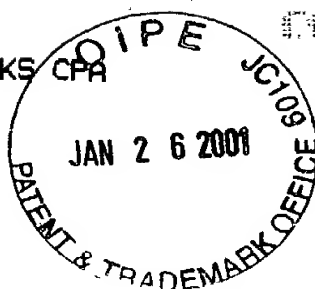
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P.04/04



SOFER & HAROUN, L.L.P.  
DECLARATION, POWER OF ATTORNEY & PETITION

ATTORNEY DOCKET NO: 918-002

### POWER OF ATTORNEY

I hereby appoint the following patent attorneys and/or patent agent(s) with full power of appointment, substitution and revocation to prosecute this application, to make alterations and amendments thereto, to receive the patent, and to transact all business in the Patent Office connected therewith.

Joseph Sofer (Reg. No. 34,438)  
Robert M. Haroun (Reg. No. 34,345)  
Thomas C. Hughes (Reg. No. 42,674)  
David I. Greenbaum (Reg. No. 46,739)

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New York, New York 10173  
Telephone: (212) 697-2800  
Facsimile: (212) 697-3004

### PETITION

Wherefore, I pray that Letters Patent be granted to me for the invention or discovery described and claimed in the above-mentioned specification and claims, and I hereby subscribe my name to the foregoing Declaration, Power of Attorney & Petition with references to the above-identified specification and claims.

### SIGNATURE

Name of sole inventor: Kristjan Bjorn OMARSSON  
Home Address: Grund Villingsholltshepi, 801 Selfoss ICELAND  
Post Office Address: Same as Above  
Citizenship: Iceland

Inventor's Signature: Kristjan B. Omarsson Date: 09, 01, 2001

TOTAL P.04

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